POPOV, M.P.; DECIU, E.D.; MITRICA, I.

Optimum economical conditions for the turning of carbon steel.
Studii cerc mec apl 13 no.4:1001-1020 '62.

The influence of the ...

S/[illegible]
E274/E304

on this contact surface, the wear will evidently be reduced. As in the case of the choice of the rounding-off radius $\underline{r}$ must depend on the rigidity of the system, recommending that the following limits are not exceeded: $\underline{r} = (2 - 4)\underline{s} = (0.2 - 1)\underline{t}$ (where $\underline{s}$ - the advancing rate in mm/turn and $\underline{t}$ - the depth of the cut in mm), then the durability of the tool can be increased by 30 - 80%, in proportion to $\underline{r}$. There are 12 figures and 5 Soviet-bloc references.

SUBMITTED: July 29, 1961

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APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

S/O[illegible] [illegible]
1272/D[illegible]

The influence of the ...

angle α. Maximum durability is obtained when they are [illegible] in va-
lue: $-\gamma_f = \alpha$. It was also determined that, in addition, [illegible]
durability is obtained in proportion to the difference between the
optimum angle γ_f and the optimum raking angle γ_{opt}. It was next
determined that the width f must absolutely be smaller than the
plastic deformations on the cut in its zone of contact with the
raking face, and best results are obtained if f = (2.5 - 2.[illegible])a
(where a is the width of the cut); as the zone of plastic deforma-
tions in the cut increases with increase of the cut width, it is
possible to perform larger widths of the bevel. This bevel (along
the main cutting edge) increases further the resistance to [illegible]
and resistance to fragmentation of the edges. A rounding off of the
tool tip was found to increase the durability of the tool in a man-
ner similar to the main working angle [illegible]. As the length of the cut-
ting edge in contact with the item material increases in proportion
to the rounding radius, thus increasing the contact surface on the
main placing face of the tool and reducing the specific pressure

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R/[illegible]/62/[illegible]/[illegible]/[illegible]/[illegible]
D2[illegible]/D3[illegible]

AUTHORS: Popov, [illegible], Mitrică, I. and Deciu, [illegible]

TITLE: The influence of the bevel and the [illegible] upon the wear of the cutting tool

PERIODICAL: Mecanică aplicată, 13 no. 1, 1962, 205-21[illegible]

TEXT: Results are given of research undertaken at the Institutul de mecanica aplicată 'Traian Vuia' (Institute of Applied Mechanics 'Traian Vuia'). It was first determined that a bevel face along the main edge of the lathe cutting tool can reduce tool wear considerably, if it is realized with consideration of its two parameters -- its width f and its angle of inclination γ_f. Examination of the equilibrium of the plastic deformations in the cutting zone has indicated the existence of only one angle γ_f which renders [illegible] durability; a theoretical, as well as practical, investigation has indicated a close connection between γ_f and the principal [illegible]

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POPOV, Mihai, ing.; DECIU, Eugen, ing.; MITRICA, Ilie, ing.

Conditions for the economical steel splintering, required by STAS (state standard) 500-49. Metalurgia constr mas 13 no.10:873-879 O '61.

(Metal cutting) (Steel)

POPOV, M. P., conf. ing.; DECIU, E. D., cand. st. tehn., ing.;
MITRICA, I., ing.

Splintering qualities of some Rumanian high-speed steels.
Metalurgia constr mas 13 no. 3: 212-217 Mr '61.

33740

The geometry of cutting tools ... R/008/61/000/006/004/005
D272/D304

on the durability of the tool, and fine polishing enabled improved pressure distribution on the contact surfaces, resulting in slower wear. There are 16 figures and 17 Soviet-bloc references.

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The latter formula is difficult to employ in practice and, therefore, the use of a table is suggested. Examination of the other cutting tool angles on nine steels of the above-mentioned two categories indicated the following optimum values - $\alpha = 11^\circ$, $\alpha_1 = 15^\circ$, $\varkappa = 45^\circ$, $\varkappa_1 = 10^\circ$, $\lambda \approx 0$. These values do not depend on the nature of the processed material in the case of the steels processed in this study. In the case of the main working angle there is no actual optimum value, as the tool durability is increased with the max. possible decrease of $\varkappa$, thus choosing the minimum value of $\varkappa$ for each respective profile processed, as well as for each rigidity of the processed item (higher rigidity enables smaller $\varkappa$). It was also established that at appropriate hardnesses the material of cutting tool does not affect the optimum angles. At 10-15 HRC units the deformations of the tool do not differ appreciably, and the initial optimum contact surfaces do not modify and the wear will be the slowest, as was demonstrated on a series of metal carbides and mineralo-ceramic materials. In addition to the size of the initial contact surface, its quality was found to have an appreciable effect

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S/008/61/000/006/004/005
D272/D304

The geometry of cutting tools ...

placing angles α and α_1, the main and secondary working angles $\varkappa$ and $\varkappa_1$, and the inclination angle of the main cutting edge λ. A close relationship was found between the wear and the geometry of the 5 active faces, determining that the optimum contact surfaces -- which are defined as the initial surfaces corresponding to the optimum angles -- correspond to a distribution of the specific pressures resulting in the slowest destruction of the active faces. The front rake angle was found to depend on the intensity of the deformations originating in the cutting zone of the processed wear, thus a different front rake angle must be chosen for each type of steel processed if an optimum initial contact surface is desired. This is born out by empirical formulas (function of the ultimate tensile strength and function of the Brinell hardness). As the hardness depends on the carbon content it was possible to derive the dependence of the rake angle on the carbon content

$$\gamma = 71.43 \log \frac{0.805}{C + 0.278} \quad (7)$$

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R/008/61/000/006/004/005
D272/D304

14000

AUTHORS: Popov, M. P., Mitrică, I., and Deciu, E. D.

TITLE: The geometry of cutting tools for carbon steel processing

PERIODICAL: Studii si cercetări de mecanică aplicată, no. 6, 1961, 1357 - 1378

TEXT: The problem of the geometry of the turning cutting tool for processing ordinary heat treated carbon steels (STAS 500-49) and heat treated quality carbon steels (STAS 880-49) has been investigated in a series of tests performed at the "Institutul de mecanica aplicata - Traian Vuia" (Institute of Applied Mechanics) - Traian Vuia. The study is based on the evolution of wear with time up to the ceiling of wear δ_{α_1} = 1 mm on the secondary placing face, the results being presented by means of the correction coefficients of the durability - τ - which are dimensionless. The study was concentrated on the main angles of the active part of the turning cutting tool, namely the front rake angle γ, the main and secondary

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R/009/61/000/003/001/002
D015/D105

Cutting characteristics of some Rumanian high-speed steels

taps, reamers, formed milling-cutters, etc. The STAS 3611-59 standard also lists high-speed steels with cobalt as the main alloying element. These steels designated as RK-100 and RK-50 should be used for cutting-tools, especially, for cutters used in heavy machining at high speeds and in machining very hard steel. Cutters with steel-cobalt-alloy tips are better than cutters with carbide tips for the range of cutting speeds mentioned. The manufacture of high-speed steel tools should be based on the quality of high-speed steel, on the heat treatment, and the mechanical characteristics of the pieces to be machined. There are 10 figures, 10 tables, and 4 references: 3 Soviet-bloc and 1 non-Soviet-bloc.

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Cutting characteristics of some Rumanian high-speed steels

show that lathe cutting tools made from RMo-50 steel make for higher economical speeds. A comparative analysis can also be made by using the K_m coefficient defined as

$$K_m = \frac{v_{60}RMo\text{-}50}{v_{60}RW\text{-}180} \qquad (5)$$

This shows that RW-180 tools are recommended for $K_m < 1$ and RMo-50 tools for $K_m > 1$. The results obtained by the I.M.A. laboratory were confirmed at the industrial level at the "23 August" Plant which tested many types of tools. The results proved that RMo-50 steel is cheaper than RW-180. Therefore, RMo-50 should be used for general purposes, such as lathe cutters, planing cutters, slotting cutters, milling cutters, etc. The RW-180 steel is recommended for tools which produce small chips, such as twist drills, screw-

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D015/D105

Cutting characteristics of some Rumanian high-speed steels

sharpening, $K_3 > 1$. By performing a groove and a chamfer on the main cutting edge, an increase of the economical speed was obtained, i.e. $K_3 > 1$. The values of the K_T coefficient are given in Table 4 and the values of the speed correction coefficients in relation to geometric parameters in Tables 5 to 9. The power required for the cutting process was determined from:

$$N = C_2 t^{x_1} \cdot s^{y_1} \cdot v^{z} \qquad (4)$$

where N is the cutting power in kw; C_2, constant in relation to the machined material and other parameters included in K, and x_1, y_1, z, exponents in relation to the machined material. Experimental numerical values from this equation are given in Table 10 showing that the values for tools made from the 2 types of high-speed steels, did not differ appreciably. Fig. 7 and 8

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Cutting characteristics of some Rumanian high-speed steels

where K_1 is the correction coefficient in relation to the mechanical properties of the machined material; K_2, correction coefficient in relation to the cooling system used; K_3, correction coefficient of the cutter in relation to the sharpening method; K_4, correction coefficient in relation to the homogeneity of the material, the presence of slag, etc. resulting from cold drawing; K_T, correction coefficient in relation to the economical tool life; K_m, correction coefficient in relation to the material of the cutter; and K_γ, K_α, K_{α_1}, K_χ, K_{χ_1}, K_λ, correction coefficients in relation to γ, α, α_1, χ, χ_1, and λ angles. The K_1 value was considered to be 1 for each type of steel used in the experiments. For cutting operations performed without cooling, it was taken that $K_2=1$, but $K_2 > 1$ with cooling. In case of sharpening mentioned above, it was considered that $K_3 = 1$; while with high-quality

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D015/D105

Cutting characteristics of some Rumanian high-speed steels

different conditions are used for determining the speed-correction coefficients. The economical cutting speed is calculated from the formula

$$v_T = \frac{C}{t^x \cdot s^y} \cdot K \qquad (2)$$

where v_T is the cutting speed for the economical tool life T of the cutter in m/min; t, cutting depth in mm; s, feed in mm/revolution; C, constant in relation to the machined material; x and y, exponents in relation to the machined material and K, overall correction coefficient of the speed. The numerical values obtained are shown in Table 3 and are used in Eq. (2) for calculating the economical speed v_{60} for s = 0.1 - 1 mm/revolution and t = 0.5 - 6 mm.

The overall correction coefficient of cutting speed is expressed by:

$$K = K_1 \cdot K_2 \cdot K_3 \cdot K_4 \cdot K_T \cdot K_m \cdot K_\gamma \cdot K_\alpha \cdot K_{\alpha_1} \cdot K_\chi \cdot K_{\chi_1} \cdot K_\lambda \qquad (3)$$

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Cutting characteristics of some Rumanian high-speed steels

aşchierii metalelor în R.P.R., Metalurgia şi Construcţia de Maşini XI, (1959), nr. 10, pag. 875-877). The optimum values of the side rake angles γ; side clearance angles α; front clearance angles α_1; secondary adjusting angles χ_1 and back rake angles λ were determined on the basis of geometrical parameters and are given in Table 1. They are also valid for tools made from RW-180 and RMo-50 steels. The numerical values of the relation between cutting speed and tool life were established by the equation

$$vT^n = C_1 \qquad (1)$$

where v is the cutting speed in m/min and T, tool life in min. The variation of the relation between cutting speeds and tool life when cutting 35MoCN 20 steel with an RW-180 cutter is shown in Fig. 1 and when cutting OL-38 steel with an RMo-50 cutter in Fig. 2. The interpretation of these values shows that the exponent n is independent of speed, feed and cutting depth. The n_{med} values given in Table 2 calculated as an average of values obtained under

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Cutting characteristics of some Rumanian high-speed steels

jected to heat treatment at the Uzinele "23 August" (Plant) in Bucharest. The RW-180 steel is composed of 0.76% C; 4% Cr; 19% W; 0.15% Mo and 1% V. The RMo-50 steel is a new product of the plant having molybdenum as the main alloying element and consisting of 0.84%C; 4.1% Cr; 5.4% W; 5% Mo and 1.64% V. The tool hardness was 63-65 Rc. The tools were sharpened by subjecting them to a roughing and a finishing operation. Rough grinding was carried out with artificial corundum with a ceramic bond having a J-K hardness and a 36-60 granulation. The finishing was carried out with silicon carbide with a ceramic bond having a K hardness and a 60 granulation. The tools had no groove or chamfer. The experiments with tools from RW-180 and RMo-50 steels were conducted on OL-38 carbon steel according to STAS 500-49 and on 35 MoCN 20 alloy steel. The samples made of OL-38 steel had δ_k = 39-46 kgf/sq mm. The analysis of 35 MoCN 20 steel samples showed the following composition: 0.36-0.39% C; 0.66-0.67% Mn; 0.70-0.80% Cr; 0.18-0.22% Mo; 1.80-1.90% Ni and δ_r = 67-73 kgf/sq mm. The experiments were carried out on cutting operation parameters as given by M. Popov, I. Mitrică, E. Deciu (Ref. 2: Aspecte ale cercetării ştiinţifice în domeniul

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R/009/61/000/003/001/002
D015/D105

AUTHORS: Popov, M.P., Engineer, Instructor; Deciu, E. D., Engineer, Candidate of Technical Sciences, and Mitrică, I., Engineer

TITLE: Cutting characteristics of some Rumanian high-speed steels

PERIODICAL: Metalurgia şi Construcţia de Maşini, no. 3, 1961, 212-217

TEXT: The article deals with Rumanian standardized alloy steels used in tool making, and, in the light of recent specified requirements listed under STAS 3611-59, reviews problems and general conditions of domestic high-speed steels by analyzing and computing their cutting characteristics. The Institutul de Mecanică Aplicată "Traian Vuia" ("Traian Vuia" Institute of Applied Mechanics) of the Rumanian Academy conducted experiments on cutting operations using a lathe equipped with Rumanian high-speed-steel cutting-tools which were studied by M. Popov, I. Mitrică and E. Deciu (Ref. 1: Studii asupra parametrilor aşchierii cu cuţite de strung din oţel rapid romînesc. Studii şi cercetări de Mecanică Aplicată, X (1959), no. 2, pag. 539-564). The materials used in the tools were RW-180 and RMo-50 high-speed steels both manufactured and sub-

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POPOV, M. P.; MITRICA, I.; DECIU, E.

Study of the power necessary to the cutting of ordinary carbon steel. Studii cerc mec apl 11 no.6:1481-1495 '60.

Use of Metal-Ceramic Tips in Lathe Work R/009/60/000/009/003/008
A125/A026

plying a 0.2 mm wide chamfer along the cutting edge, using a better shank, improving the tip quality, etc. There are 5 figures, 3 tables, 1 photograph and 6 references: 2 Rumanian, 1 Soviet, 2 French and 1 German.

ASSOCIATION: Secţia de maşini şi mecanisme, Institutul de mecanică "Traian Vuia" (Section of Machines and Mechanisms, Institute of Applied Mechanics "Traian Vuia")

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APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

5 and 6). Subject article contains a part of the conclusions being of immediate importance to those who work with such tips. The plastic and elastic deformations occuring in the detaching zone of the shavings are very favorable. Thus, the same optimum geometry has been obtained with the ENC_1 tip having a hardness of HR_c = 65 - 74 as with carbide tipped tools, when machining the same steel. The point of the tool was $r \approx 0.5$. The deviations from the optimum values of the cutting edge angles should not exceed $\pm 1^{\circ}$. Because of the initial shape of the ENC_1 tips, experiments with an end clearance $\chi = 45^{\circ}$ could be accomplished. Regarding the optimum machining conditions, a greater dispersion of results could be established with ENC_1 tips than with carbide tip. The economic cutting speed can be computed:

$$v_T = \frac{C}{t^x s^y} K \qquad (2)$$

in which v_T = economic speed for a durability of T, in m/mm; t = cutting depth in mm; s = feed in mm/rev; K = the overall correction factors. The useful power consumed can be computed with the formula $N = C_2 t^{x_1} s^{y_1} v^z$ (kw). (3). The results obtained in machining "OL 60" and "OL 70" steels with ENC_1 tips are slightly below the results obtained with S_1 and $I_{15} K_6$ carbide tips, but are comparable with the results obtained with S_3 and $T_5 K_{10}$ carbide tips. The results can be improved by lapping the tips, by using tool points with a greater radius (up to 2 mm), by ap-

R/009/60/000/009/003/008
A125/A026

AUTHORS: Popov, Mihail, Paul, Lecturer, Engineer, Candidate of Technical Sciences, Chief of Laboratory; Deciu, Eug., Engineer, Researcher; Mitrică, Ilie, Engineer, Researcher

TITLE: Use of Metal-Ceramic Tips in Lathe Work

PERIODICAL: Metalurgia și Construcția de Mașini, 1960, No. 9, pp. 796 - 801

TEXT: Subject article deals with metal-ceramic tips and presents some investigations conducted in many countries. Brief reference is made to the composition of metal-ceramic tips, their grinding and fastening to the shank. Isayev, Zorev and Kuchma (Ref. 1) have presented various possibilities of fastening metal-ceramic tips to the tool shank. The Rumanian INCERC has developed a metal-ceramic tip named ENC, which revealed good results. Experiments with ENC1 tips regarding the optimum geometric elements, the best machining conditions, etc, have been conducted in the Laboratory of the Institutul de Mecanică Aplicată "Traian Vuia" (Institute of Applied Mechanics "Traian Vuia") of the Academia R.P.R. (Rumanian Academy), in cooperation with Engineer M. Calciu. The experiments have been conducted on "OL 60" and "OL 70" steels (STAS 500-49) in accordance with methods used at carbide tipped tools. The results have been presented in two previous papers (Refs.

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B/008/60/000/004/012/018
A125/A126

Wear resistance of cutting tools ....

geometry on the durability of the tool. There are 6 figures, 4 tables and 6 Soviet-bloc references.

SUBMITTED: February 26, 1960

Card 2/2

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

R/008/60/000/004/012/018
A125/A126

AUTHORS: Popov, M. P., Mitrică, I., and Deciu, E.

TITLE: Wear resistance of cutting tools in function of their geometrical parameters

PERIODICAL: Studii şi Cercetări de Mecanică Aplicată, no. 4., 1960, 983 - 995

TEXT: Soviet workers, e.g., Bykov, Berkevich, and Kolesov, have developed excellent cutting tool geometries, matching the requirements of a high-speed cutting process. The chemical composition of the steel is very important for the determination of the machining ability. Starting from the development in the use of a cutting tool, the authors examine and determine the optimum geometric parameters in case of the machining of parts made of conventional, heat-treated carbon steels (STAS 500-59). The obtained relations furnish the connection between the geometrical parameter values and the mechanical characteristics, or, rather, the carbon contents of the steels submitted to the tests. Further, the authors examine the influence of the deviations from the optimum

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MITRICA, I: DECIU, E.: POPOV, M

Aspects of the scientific research in the field of metal cutting in Rumania
p.875

METALURGIA SI CONSTRUCTIA DE MASINI. (Ministerul Industriei Metalurgice si Constructiilor de Masins si Asociatia Stiintifica a Inginerilor Si Technicienilor din Rominia) Bucuresti, Rumania
Vol.11, no.10 Oct. 1959

Monthly list of East European Accessions (EEAI) LC, Vol.9, no.2 Feb. 1960

Uncl.

MITRICA, I.; DECIU, E.; [illegible], [illegible]

Centralizing installation of measurement systems for the study of cutting machines and tools. p.923

STUDII SI CERCETARI DE MECHANICA APLICATA. Academia Republicii Populare Romine
Bucuresti, Rumania
Vol. 10, no.3, 1959

Monthly List of East European Accessions (EAI) LC., Vol. 9, no.1, Jan. 1960
Uncl.

80419
RUM/8-59-1-14/24

On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips

ceramic tips because of their properties, but can be reduced by choosing a respective variation of the cutting parameters. Optimum working conditions with immediate practical use can be established for both types of tips. The wear of "ENC_1" mineral ceramic tips, increases faster than that of "S_1" steel tips, which leads to a reduction of the accuracy during long time machining. Based on this article the authors conclude that tools with steel tips could at least partially be replaced by tools with mineral ceramic tips.
There are: 14 graphs, 3 tables and 9 references, 4 of which are Rumanian, 3 Russian and 2 French.

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SUBMITTED: July 7, 1958

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80419

RUM/8-59-1-14/24

On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips

$$Nv_{60} = 3.58\ s^{0.70}\ t^{0.76}, \qquad (17),$$

in case of "OL-60" steel machined with ENC_1 tip;

$$Nv_{60} = 3.49\ s^{0.25}\ t^{0.57}, \qquad (18)$$

in case of "OL-70" steel machined with S_1 tip; and

$$Nv_{60} = 2.96\ s^{0.57}\ t^{0.59}, \qquad (19),$$

in case of "OL-70" steel machined with ENC_1 tip. In case of using nomograms, the respective K_i speed correction coefficients have to be used if not all conditions are matched. Following the presented results based on approximately 4,000 experimental determinations made with two types of steel, the authors have drawn the following conclusions on the behavior of mineral ceramic tips, compared with steel tips: The hardness variation curves in function of the speed or cutting depth show the same behavior with both types of tips. The hardness variation law in function of the cutting speed keeps the same shape independently from the type of tip used. The general formulae (Nr 4 and 11) of the optimum cutting speed and of the consumed effective power of steel tips can also be extended upon the mineral

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in case of "OL-60" steel machined with S_1 tip;

$$N = 0.0452\ t^{0.89}\ s^{0.68}\ v, \qquad (13),$$

in case of "OL-70" steel machined with S_1 tip;

$$N = 0.0387\ t^{0.93}\ s^{0.96}\ v, \qquad (14),$$

in case of "OL-60" steel machined with ENC_1 tip; and

$$N = 0.0387\ t^{0.89}\ s^{0.84}\ v, \qquad (15),$$

in case of "OL-70" steel machined with ENC_1 tip. A comparing of the consumed effective power in case of the machining of the same steel but with different tips, is presented by (Figure 10). All tips (S_1 and ENC_1) had a wear of: $\delta\alpha_1 < 0.4$ mm. Inserting the expressions of the optimum speeds given by the relations (Nr 7, 8, 9, 10) into the formulae of the effective power (Nr 12, 13, 14, 15), the authors have obtained the expressions of the effective power in case of machining with the optimum speed v_{60}:

$$Nv_{60} = 3.78\ s^{0.35}\ t^{0.72}, \qquad (16),$$

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in case of "OL-60" steel machined with S_1 tip;

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RUM/8-59-1-14/24

On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips

$$v_{60} = \frac{76.6}{t^{0.30}\ s^{0.27}} \qquad (10)$$

for "OL-70" steel machined with ENC_1 tip. To facilitate the calculations, the formulae (Nr 7, 8, 9, 10) can be represented by nomograms [Ref 3]. The optimum cutting speed of ENC_1 tips are lower than of S_1 tips. A comparing nomogram concerning only the feed is represented by (Figure 9). d) Influence of the cutting parameters on the effective power. Formulae for the determination of the machining power: Based on a general formula which comprises the influence of the different parameters of the optimum cutting conditions:

$$N = C_2 t^{x1}\ s^{y1}\ v^{z} \qquad (11),$$

in which N is the effective cutting power, kw; C_2 is the constant, in function of the machined material and other parameters comprised in the overall correction coefficient K; t is the cutting depth, mm; s is the tool feed, mm/rev; v is the machining speed, m/mm; x_1, y_1, z are the exponents in function of the machined material, the authors have determined the following formulae of the consumed effective cutting power:

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$$N = 0.0384\ t^{0.87}\ s^{0.73}\ v, \qquad (12)$$

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On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips

the machined material; K_2 is the correction coefficient in function of the used cooling system; K_3 is the correction coefficient in function of the sharpening mode of the tip; K_4 is the correction coefficient in function of the homogeneity of the strata; K_T is the correction coefficient in function of the economical hardness of the lathe tool; and K_m is the correction coefficient in function of the tip material; the authors establish the following formulae at the interval t = 0.1 - 3 mm and s = 0.1 - 0.8 mm/rev:

$$v_{60} = \frac{98.4}{t^{0.15}\ s^{0.38}} \quad (7)$$

for "OL-60" steel machined with S_1 tip;

$$v_{60} = \frac{77.2}{t^{0.32}\ s^{0.43}} \quad (8),$$

for "OL-70" Steel machined with S_1 tip;

$$v_{60} = \frac{93.1}{t^{0.17}\ s^{0.26}} \quad (9),$$

for "OL-60"steel machined with ENC_1 tip; and

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4

80419

RUM/8-59-1-14/24

On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips

with ENC_1 tips, the maximum error appears at the $K\gamma$ coefficient if $\gamma = -5^o$. The maximum error of the adimensional correction coefficients is smaller than that of the "n" exponent. The value of the nondimensional correction coefficients of the speed can be computed with an admissible error. c) Influence of feed and cutting depth on the speed; formulae for optimum economic speeds: Starting with the cutting speed formula:

$$v_T = \frac{C}{t^x s^y} K, \quad (4),$$

in which v_T is the optimum cutting speed for an economical hardness T of the tool, m/min; t is the cutting depth, mm; s is the tool feed, mm/rev; C is the constant in function of the machined material; x and y are the exponents in function of the machined material; K is the overall correction coefficient of the speed, which has the following shape:

$$K = K_1, K_2, K_3, K_4, K_T, K_m, K_\gamma, K_\alpha, K_{\alpha 1}, K_\chi, K_{\chi 1}, K_\lambda, \quad (5)$$

in which K_γ, K_α, $K_{\alpha 1}$, K_x, K_{x1}, K_λ are the geometrical correction coefficients in function of the angles γ, α, α_1, x, x_1, λ; K_1 is the correction coefficient in function of the mechanical characteristics of

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On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips

shows that "n" depends from the processed material and the type of tip used. This maximum deviation $\Delta n_{max}\%$ of "n" against the average are given by Table 2. The effects of these deviations are reduced. For the determination of the correction coefficient K_T of the economical speed in function of the hardness, the following relation is used [Ref 3]:

$$K_T = \frac{v_T}{v_{60}} = \left(\frac{60}{T}\right)^n , \qquad (2),$$

in which v_T is the cutting speed for a hardness of T, m/min and v_{60} the cutting speed for a hardness of 60 min, m/min. The values of the K_T coefficients are given by Table 3. The adimensional correction coefficients are determined by using the relation:

$$K_{\gamma} = (\tau_{\gamma})^n , \qquad (3).$$

K[illegible] for [illegible] = 5^o has the maximum error in case of "OL-60" steel, machined with S_1 tips. In case of machining "OL-60" steel with ENC_1 tips, the maximum error appears at the K_{γ} coefficient if $\gamma = -10^o$. In case of machining "OL-70" steel with S_1 tips, the K_T coefficient has the maximum error for a hardness of 120 minutes. Machining "OL-70" steel

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4

80419
RUM/8-59-1-14/24

On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips

and d) Influence of the cutting parameters on the effective power. a) Influence of feed and cutting depth on the wear of the cutting tool: Many experiments have been conducted in order to study the influence of feed, maintaining a constant cutting speed and depth. The correlations T = f (s) are presented by (Figures 1 and 2). The study of the influence of the cutting depth was established in the same way, maintaining a constant cutting speed and feed. The results are given by (Figures 3 and 4). All curves presented by (Figures 1, 2, 3, 4) can be linearized in logarythmic coordinates. b) Influence of the speed on the wear of the cutting tool: The connection between the speed and the hardness of steel tips is expressed by the formula:

$$vT^n = C_1, \qquad (1).$$

This relation is valid for steel tips and mineral ceramic tips. Thus, the influence of feed and cutting depth can be neglected. The linearization of the experimental curves can be made in logarythmic coordinates in both cases. Some results with steel tips are expressed by (Figures 5 and 6) and with mineral ceramic tips by (Figures 7 and 8). The values of the "n" exponent in case of mineral ceramic tips are expressed by Table 1, which

Card 2/9

80419
RUM/8-59-1-14/24

25.7000

AUTHORS: Popov, M., Mitrică, I., Deciu, E.

TITLE: On the Optimum Cutting Conditions With Lathe Tools Armored With Mineral Ceramic and Steel Tips

PERIODICAL: Studii si Cercetări de Mecanică Aplicată, 1959, Nr 1, pp 219 - 240 (RUM)

ABSTRACT: A comparing study of lathe tools armored with mineral ceramic tips and steel tips has been previously accomplished [Ref 1], establishing the optimum geometrical parameters in case of machining "OL-70" and "OL-60" steels. Subject article presents experiments conducted with the same steels by using "ENC_1" mineral ceramic tips (hardness: 65-74 H_{RC}) made by the Institutul de cercetări stiintifice pentru constructii, materiale de constructii si industrializarea a lemnului (Institute for Scientific Research of Constructions, Construction Materials and Industrial Processing of Wood), and "S_1" steel tips (hardness: 70-78 H_{RC}) made by Harith. Similar to the previous articles [Refs 1, 2, 3], this study is based on the tracing of the wearing off evolution. The following problems have been studied by the authors: a) Influence of feed and cutting depth on the wear of the cutting tool; b) Influence of the speed on the wear of the cutting tool; c) Influence of feed and cutting depth on the speed;

Card 1/9

MITRICA, I.; DECIU, E.; POPOV, A.

A comparative study of the geometric parameters of the cutting tools fitted with mineral-ceramic plates and plates on the basis of metallic carbides.
p.1077

STUDII SI CERCETARI DE MECANICA APLICATA. Academia Republicii Populare Romine
Bucuresti, Rumania
Vol. 9, no.4, 1958

Monthly List of East European Accessions (EEAI) LC, Vol. 9, no.1, Jan. 1960
Uncl.

MITRICA, I., POPOV, M., DECIU, E.

A boundary condition in the hydrodynamic analogy of lamination. p. 2339

Academia Republicii Populare Romine. Institutul de Mecanica Aplicata. STUDII SI CERCETARI DE MECANICA APLICATA. Bucuresti, Rumania, Vol. 8, No. 4, 1957

Monthly List of East European Accessions (EEAI) LC, Vol. 8, No. 8, Aug. 1959
Uncl.

MITRICA, I.

The study of specific pressures upon the contact surface in the laminating process.

P. 557(Academia Republicii Populare Romine. Institutul de Mecanica Aplicata. STUDII SI
CERCETARI DE MECANICA APLICATA. Vol. 7, no. 2, Apr./June 1956. Bucuresti, Rumania)

Monthly Index of East European Accessions (EEAI) LC. Vol. 7, no. 2,
February 1958

TANASE, S., ing.; MITRIC, A., ing.

Planning of chutes for the feeders. Hidrotehnica 6 no.10:353-357
O '61.

(Hydraulic engineering) (Water supply)

MITRIC, A., ing.

Planning of the spillways with a practical profile and a gable upon the crest. Hidrotehnica 6 no.10:350-352 O '61.

(Spillways)

WISNER, P., ing.; MITRIC, A., ing.

Studies on the entrainment of the air by overglowing nappes in dam weirs. Hidrotehnica 6 no.9:310-314 S '61.

1. Membru al Comitetului de redactie, "Hidrotehnica" (for Wisner).

MIRCHINK, M.F.; KHA[illegible] [illegible], [illegible]; [illegible], V.I.; [illegible]KIN, Ya.[illegible]; [illegible], O.[illegible]; [illegible], [illegible]; [illegible], A.F.; red.

[Tectonics and the zones of oil and gas [illegible]ation in the system of the Kama Kinel' troughs] [illegible] i zony neftegazonak[illegible]enila Kamsko-Kinel'sk[illegible] [illegible] progibov. Moskva, Nauka, 19[illegible]. [illegible] p. (MIRA 18:[illegible])

1. Moscow. Institut [illegible] i [illegible] [illegible] payemykh.

MITREYTER, M.

Stand used to demonstrate techniques for the maintenance of storage batteries. Avt.transp. 35 no.4:30 Ap '57. (MLRA 10:5)
(Automobiles--Batteries)

MIRCHINK, M.F.; KHACHATRYAN, R.O.; MKRTCHYAN, O.M.; GROMEKA, V.I.; MITREYKIN, Yu.B.; NARTOV, G.V.

Outlook for finding petroleum and trends in prospecting operations in the Kama-Kinel' system of troughs. Geol. nefti i gaza 9 no.9:1-7 S '65. (MIRA 18:9)

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

MITREYKIN, L.B., kand.tekhn.nauk, inzh.-kapitan 2-go ranga

Prevention and localization of accidents of atomic power plants. Mor. sbor. 47 no.12:66-73 D '63.

(MIRA 18:12)

penetration this process differs favorably from the grinding process involving grinding disks having a ceramic base which evokes primarily tensile residual stresses in the product parts ground. Only during tape-grinding without cooling and in high-pressure operation do tensile residual stresses of the order of 10-20 kg/mm^2 arise; but even then the depth of stress penetration does not exceed 5-10 μ; at greater depth compressive stresses prevail. The immediate objective should now be the development of a process for the making of high-grade water-resistant abrasive tapes with an electrostatic application of the abrasive, since the use of oil cooling produces great difficulties in mass production. Another needed step is the standardization of abrasive tapes and the development of an All-Union Standard (GOST) for the purpose of organizing a centralized production and supply of tapes (in a manner analogous to that of other types of cutting tools). There are 8 figures, 2 tables, and 6 Russian-language Soviet references.

source of wear of the abrasive tape is the "self-grinding" of the abrasive layer by free grains, torn off - especially during the initial period of grinding - and pressed back against the tape by the surface of the product to be ground. It was determined that the heat developed in the actual cutting zone reduces the strength of the adhesive binder and increases its elasticity, whereupon the abrasive grains acquire an exceeding mobility and the cutting properties of the tape are impaired. Therefore, the use of cooling provisions in tape-type grinding machines is indispensable for the maintenance of a constant temperature of the lubricating liquid during grinding. The tape temperature appears to be an important factor in determining the effectiveness of the grinding process. The theory of the effect of tape tension requires substantial additional study. It is found that during less strenuous grinding operations the tape loses its grinding effectiveness through dulling of the grains, whereas during strenuous grinding operations the plastic binder deformation becomes so great that the losses of abrasive grains mount. The friction coefficient between the fabric base of the tape and the binder against steel was found to be of the order of 0.18-0.25, whereas the friction coefficient between the abrasive surface and steel is 0.45-0.75 (depending on the grain size of the abrasive); the respective friction coefficients with mineral-oil lubrication are 15-20% lower. Tape grinding with cooling by mineral oil or an emulsion results in the formation in the surface layer of residual compressive stresses, both in the axial and in the tangential sense; in magnitude and in depth of

S/795/62/000/000/004/007

AUTHOR: Mitrevich, K.S.

TITLE: The grinding of steels and heat-resistant alloys by means of abrasive tapes.

SOURCE: Vysokoproizvoditel'noye shlifovaniye. Ed. by Ye. N. Maslov. Kom. po tekh. mashinstr. In-t mashinoved. AN SSSR. Moscow, Izd-vo AN SSSR, 1962, 149-161.

TEXT: The paper describes the results of an experimental investigation of the structural characteristics and the mechanical properties of abrasive tapes used in grinding; the specific objective of the investigation is a study of the effectiveness of the process of tape grinding and of the mechanism of the wear of abrasive tapes. The character of the stresses and deformations occurring in an abrasive-loaded tape in passing over an airfoil-like shape is analyzed in detail, and it was found that the sources of the wear of an abrasive tape during grinding of metals appear to be the following: (a) The nonuniformity of the elastic and plastic deformation of the tape; (b) the failure of the abrasive grains under the influence of thermal stresses; (c) the wear of the grains under the effect of chemical actions; and (d) the sticking of metal particles onto the worn areas of the grains. An additional, transient,

Card 1/3

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

MITREVICH, K.S.

Cutting forces exerted in abrasive-belt grinding. Stan.i instr. 31 no.4:25-29 Ap '60. (MIRA 13:6)
(Grinding and polishing)

MITREVA, Nedelia; PAVLOV, Pavel K.

Influence of ammonium nitrate and superphosphates on the germination of millet. Selskostop nauka [2] no. 2: 250-251 '63.

MITREVA, Nedelia; PAV[illegible]V, [illegible] K.

Interaction of [illegible] due to [illegible].
Selskostop nauka 4 no.9:[illegible]-[illegible] '64.

MITREVA, N., ml. nauchen sutrudnik

Mutual relations between plants. Nauka i tekh mladezh 14 no.10:28-29 O '62.

MITREVA, N.

[redacted]

Tuberculosis in BCG-vaccinated children; preliminary report.
Suvrem. med., Sofia 7 no.7:22-31 1956.

1. Iz Detskata protivotuberkulozna bolnitsa-Sofiia.
(TUBERCULOSIS, PULMONARY, in inf. and child
in BCG-vaccinated child.)
(BCG VACCINATION, in inf. and child
tuberc., pulm., in vaccinated child)

MITREV, St., inzh.; DOBREV, D., inzh.

Investigation on the enrichment of the talc in the deposits near the Village of Zhivkovo, Sofia District. Min delo 16 no.11:17-20 '61.

(Tar)

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

PRAMATAROV, Iv.; MITREV, N.

On clinical picture of vibration sickness in miners of the Rhodope mining basin. Suvr. med. (Sofiia) [illegible] no.[illegible]

MITREV, Anastas.

Poultry raising Skopje, Zadruzen zivot, [illegible]. 7[illegible] p.

MITRESKI, K.

Organization of the work of workers' management. p. 1173

TEHNIKA, Beograd, Vol 10, No. 8, 1955

SO: EEAL, Vol 5, No. 7, July 1956

MITRESKI, K.

A modern capitalist enterprise. III. p. 1306. Vol. 9, No. 8, 1954. TEHNIKA. Beograd, Yugoslavia.

SOURCE: East European Accessions List, (EEAL) Library of Congress, Vol. 5, No. 8, August, 1956.

MITRAS, B.

Analogue computers. p. 379. (SLABOPROUDY OBZOR, Vol. 18, No. 6, June 1957, Praha, Czechoslovakia)

SO: Monthly List of East European Accessions (EEAL) [illegible], Vol. 6, No. 12, Dec 1957. Uncl.

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

82 533

The Mechanism of Carrier Scattering in p-Type Germanium

S/181/60/002/007/008/042
B006/B070

The authors thank I. V. Mochan for advice and discussions. There are 3 figures and 2 tables.

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of Semiconductors of the AS USSR, Leningrad)

SUBMITTED: March 5, 1960

4

Card 4/4

825 33

The Mechanism of Carrier Scattering in p-Type Germanium

S/181/60/002/007/008/042
B006/B070

$\nu = 1/\tau$, (τ - relaxation time, $u = \frac{e}{m}\tau$) is the sum of collisions with thermal vibrations (ν_{th}) and ions (ν_i), a comparison of two samples with different hole concentrations may give ν_i, mobilities u_{th} and u_i, where $\nu_i = aN$ ($a = sv$, s being the mean ionic cross section, and v the mean hole velocity) and $\frac{1}{u_i} = \frac{m}{e} aN$. Figs. 2 and 3 show the results of the calculations. Fig. 2 shows $\frac{1}{u} = f(\lg T)$ for five samples, Fig. 3 shows $\Delta\left(\frac{1}{u}\right)$ for different pairs of samples. If formula (1), $1/u_{th} = 1/u - 1/u_i$ holds for the mobilities, the $T^{-2.3}$ law is obeyed for all samples. Summarizingly, it may be said that between 100 - 450°K ν_i is independent of temperature (up to an accuracy of 10%), which diverges completely from the old theory. The mean free path of the carriers ($l = \tau v$) is, therefore, proportional to v and not to v^4, as was assumed earlier. Taking into account the scattering of holes by thermal lattice vibrations, the $T^{-2.3}$ law is well obeyed in the range of temperatures considered.

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The Mechanism of Carrier Scattering in p-Type Germanium

S/181/60/002/007/008/042
B006/B070

strongly doped samples. The authors used gallium-doped germanium with a hole concentration of $2.8\cdot10^{15}$ to 8.10^{16}. R was measured at 17,000 oe, where $R\sigma = \frac{u_l p_l + u_h p_h}{p_l + p_h} = \tilde{u}$. The index l refers to light and h to heavy holes. If it is assumed that the temperature dependence of the mobility of holes of both kinds is the same, $\tilde{u} = f(t)$ gives a correct description of the temperature dependence of the mobility of heavy holes. Fig. 1 shows u(T) on a logarithmic scale for five samples of germanium with different hole concentrations (curves 2-6). Curve 1 gives the straight line corresponding to the $T^{-2.3}$ law. When the carrier concentration is increased, the slope of the curve approaches that of the straight line. Further investigations showed that the carriers of all samples are in a non-degenerate state at all temperatures. Lower values of the mobility in samples with high hole concentrations should, therefore, be explained as being due to the effect of a scattering from negatively charged acceptor ions whose number N is equal to the number of holes p. If it is assumed that the total number of collisions per second

Card 2/4

Mitrenin, B.P.

82533
S/181/60/002/007/008/042
B006/B070

24.7700

AUTHORS: Vinogradova, M. N., Golikova, O. A., Mitrenin, B. P., Stil'bans, L. S.

TITLE: The Mechanism of Carrier Scattering in p-Type Germanium

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 7, pp. 1428-1430

TEXT: It has been shown many times already that the temperature dependence of the hole mobility of germanium in the range 100 - 300°K corresponds to the law $u \sim T^{-2.3}$, and this contradicts the theory of carrier scattering on acoustic vibrations. It was proposed to take into account also the optical vibrations to overcome this difficulty. If this is done, the mobility falls rapidly for $T < \Theta$, Θ being the Debye temperature. To check this hypothesis, u-measurements for $T > \Theta$ can be made. To be able to determine u directly from conductivity and Hall constant R, the range of impurity conductivity on the side of high temperatures must be increased. This increase takes place in more

Card 1/4

Forms of fracture... S/564/57/000/000/011/029
D258/D307

times shown by the form of fracture, as discontinuities in lines marking out the "rose" fracture and as a certain discontinuity in transition of the lines from one direction to another. There are 9 figures.

Card 2/2

S/564/57/000/000/011/029
D258/D307

AUTHORS: Mitrenin, B. P., and Aleksandriya, B. V.

TITLE: Forms of fracture in germanium and silicon crystals

SOURCE: Rost kristallov; doklady na Pervom soveshchanii po rostu kristallov, 1956 g. Moscow, Izd-vo AN SSSR, 1957, 170-173

TEXT: The present work is a description of spherical forms of fracture observed at small and electron microscope magnifications. The fractures were made by moderately strong blows. The discussion is influenced by the work of D. B. Gogoberidze (Nekotoryye ob"yemnye defekty kristallov [Some volume defects of crystals], L., Izd. LGU, 1952, p. 196), who classified fractures into "rose" and "ring" types. The results are compared with the fracture of glass. Conclusions: The conchoidal fractures in both Si and Ge crystals follow largely the planes of cleavage, giving rise to steps 0.1 - 0.2 μ in height. Anisotropy is some-

Card 1/2

137-1958-2-2762

Exploring the Possibility of Obtaining Homogeneous Germanium-Silicon (cont.)

Under a pressure of 3.5 tons/cm^2 the specimens were pressed from well mixed Ge and Si powders into the shape of rods having a cross-sectional area of 9×9 mm^2 and a length of 95 mm; then they were sintered at 800°. Used in the experiments were a Ge with a resistivity of $\sim$1 ohm/cm and an industrial Si that had been washed in acids. X-ray and microscopic studies of the resulting ingots revealed that, at a speed of travel of the band $\leq$ 5-7 mm/hr, this system of band heating turned out a homogeneous Ge-in-Si solid solution (containing from 2.25 to 40 atom-percent in the form of polycrystalline ingots. To obtain a specimen of significant length of the uniformly constituted solid solution and to build up the grains of the alloy to 4-6 mm, the fusion zone had to be moved back and forth over the specimen several times at a speed of 5-7 mm/hr.

Yu.Sh

1. Germanium alloys--Formation 2. Ceramics--Applications 3. Alloys--Fusion 4. Ingots--Test methods 5. Ingots--Test results

Card 2/2

MITRENIN, B.P.

137-1958-2-2762

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 79 (USSR)

AUTHORS: ~~Mitrenin, B.P.~~, Troshin, N.Ye., Tsomaya, K.P., Vlasenko, V.A., Gubanov, Yu.D.

TITLE: Exploring the Possibility of Obtaining Homogeneous Germanium-Silicon Alloys Through a System of "Zonal Fusion" (Issledovaniye vozmozhnosti polucheniya gomogennykh splavov germaniya s kremniyem s pomoshch'yu zonnoy plavki)

PERIODICAL: V sb.: Vopr. metallurgii i fiz. poluprovodnikov. Moscow, AN SSSR, 1957, pp 59-69

ABSTRACT: A study was made of the feasibility of and the conditions under which homogeneous Ge-Si alloys could be obtained from ceramet billets of uniform composition (containing 5:25 atom-percent Si) through a system of "zonal fusion". The zonal fusion was accomplished in an apparatus consisting of a tube (15 mm in diameter) made from transparent quartz; the tube was connected through a pressure retaining lock to a vacuum (10^{-4} – 10^{-5} mm Hg). A graphite or quartz boat containing a specimen was placed in the tube. Traveling along the tube at a speed of 5-15 mm/hr was a Silit resistor. The length of the fusion zone was 15-20 mm.

Card 1/2

137-58-5-9456

Employment of Floating-zone (cont)

passes due to the growth within it of a film that screened the field. When an asbestos cylinder ~5 cm long was mounted on the tube for purposes of heat insulation, in the vicinity of the inductor, checking and crumbling of the film diminished. The course of the melt was followed visually after the first pass and thereafter by instruments. Single crystals were obtained from the superheated zone after 4 to 7 passes when the rate of motion of the zone was 3-6 cm/hr. The employment of single-crystal seeding and rotation of the specimen facilitates production of single crystals. It was established that 6 to 8 passes of the zone make it possible to purify acid-washed Si until it is spectrally pure for 60-80% of the total length of the specimen, but the resistivity of the specimen rises little as this occurs, viz., from 0.05 to 0.08 ohm/cm. Floating zone refining of a specimen of Si with introduction of Ta^{182} into the final zone makes it possible to purify the specimen of Ta to 10^{-5}-10^{-8}% after 1 to 7 passes of the zone. The Ta is concentrated in the final portion of the bar. The concentration of Fe^{59} after the first pass drops to 10^{-4}%, and the Fe is concentrated in the final zone. Si iodide yielded single crystals that were chiefly of the p type and had a resistivity of 15-40 ohm/cm.

Yu. Sh.

1. Single crystals--Growth 2. Single crystals--Resistivity
3. Silicon iodide--Applications 4. Tantalum isotopes (Radioactive)--Applications
5. Iron isotopes (Radioactive)--Applications

Card 2/2

137-58-5-9456

MITRENIN, B. P.

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 5, p 92 (USSR)

AUTHORS: Mitrenin, ~~B. P.,~~ Lalykin, S. P., Savrasov, Yu. P., Radaykin, L. K.

TITLE: Employment of Floating-zone Refining to Produce Single Crystals of Silicon (Primeneniye bestigel'noy zonnoy plavki dlya polucheniya monokristallov kremniya)

PERIODICAL: V sb.: Vopr. metallurgii i fiz. poluprovodnikov. Moscow, AN SSSR, 1957, pp 35-40

ABSTRACT: The melts were made in an apparatus consisting of a vertical quartz tube (d=22 mm) in which a Si bar was placed vertically on two pins rotating at 1 to 50 rpm. The inductor (d=25 mm, height 4-6 mm) creating the zone was fed from a 5-kv generator working at 4 mc. The rate of motion of the bar relative to the inductor was 0.5-10 cm/hr. A vacuum of the order of $1 \cdot 10^{-5}$ mm Hg was created in the quartz tube. The specimen was heated to 700°C by current passing through it. Elongated bars 15-20 cm long and 10-13 mm in cross section, and specimens of Si iodide in the form of tubes 8-16 mm in diameter, filled with pieces of Si, were used for the melts. The quartz tube was replaced after 3 to 5

Card 1/2

137-58-4-6980

Cbtaining Single Crystals of Silicon by Extraction From a Melt

(46.6 mg per 40 g Si) undergoes virtually uniform distribution through the bar in the process of extraction, the bulk of it remaining in the melt.

I. S.

1. Single crystals--Production 2. Silicon tetrachloride--Reduction
3. Zinc--Applications

Card 3/3

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

137-58-4-6980

Obtaining Single Crystals of Silicon by Extraction From a Melt

tion opposite to that of the rotation of the crucible at a rate of 2 rpm. The rate of extraction was 0.5-1 mm/min. It was established that when a slag film existed at the surface of the melt it was not possible to obtain any single crystals, as a number of small crystals appeared at points of accumulation of slag and at the point of inoculation. Repeated extractions after careful etching and upon removal of visible slag inclusions on the surface of the bar by emery and cutting away of its ends made it possible to obtain single crystals of 15-20 mm diameter and lengths up to 240 mm. Before pulling the crystal, the melt was held for 15-20 min at the pulling temperature in order for equilibrium to be established. The opinion is offered that the polycrystallinity of a drawn bar is also due to the formation of a film of SiO_2 when the vacuum is reduced below 10^{-4} mm Hg, additional centers of crystallization being set up thereby. One of the possible causes of further increase in vacuum is the reaction of quartz and graphite, and therefore the crucibles in the apparatus employed were placed so that they would touch the bases only at three points. It was observed that vibration of the apparatus facilitated twinning in the single crystal being grown. Radioactive isotopes made it possible to determine that Sb and Ag (respectively 1.5 and 6.1 mg per 40 g Si) were completely distilled from the melt and were not to be found in the crystal. Ta (12.5 mg per 40 g Si) remained in its entirety in the zone, and was the last to solidify, while Fe

Card 2/3

MITRENIN, B.P.

137-58-4-6980

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 95 (USSR)

AUTHORS: Mitrenin, B. P., Burdiashvili, Sh. S., Shamba N. A., Volkov, V. P., Kovyrzin, V. K., Solov'yev, L. K.

TITLE: Obtaining Single Crystals of Silicon by Extraction From a Melt (Polucheniye monokristallov kremniya metodom vytyagivaniya iz rasplava)

PERIODICAL: V sb.: Vopr. metallurgii i fiz. poluprovodnikov. AN SSSR 1957, pp 24-34

ABSTRACT: The possibility of obtaining large single crystals with a specified orientation from material purified by acid washing or obtained by reduction of $SiCl_4$ by zinc, and the distribution of certain impurities in the extracted bar was investigated by the use of tagged atoms. The apparatus built employed high frequency heating of a base in which there was emplaced a quartz crucible containing the Si, or by means of a graphite resistance heater in the center of which, and on a quartz base, there was placed a graphite holder with the quartz crucible having the Si. A vacuum of 10^{-4} mm Hg was maintained in the apparatus. The crucible was free to rotate at a speed of 1 rpm, and the seed in a direc-

Card 1/3

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

MITREGA, Karol, inz.; PRADELA, Henryk, inz.

Electric car pusher with starting crank drive. Wiadom gorn 15 no.9:
287-288 S '64.

[illegible], Wladimierz, [illegible]

Electrostimulation of the pulp of teeth [illegible] by means of an [illegible] [illegible] Ap'65.

1. Z Zakladu [illegible] (Kierownik: dr. [illegible] Mickiewicz) i z Zakladu [illegible] Akademii Medycznej w [illegible] ([illegible]).

MITREGA, Jan, mgr inz.

Ways of realizing the resolutions of the Fourth Congress and the Second Plenum of the Central Committee of the Polish United Workers Party on mining and power engineering. Wiadom gorn 16 no.4:97-101 Ap '65.

1. Minister of Mining and Power Engineering, Warsaw.

MITREGA, Jan, mgr inz.

Address of the Minister of Mining and Power Engineering at the conference of the active members of mining in Piotrowice, January 18, 1965. Wiadom gorn 16 no.3:67-71 Mr '65.

1. Minister of Mining and Power Engineering, Warsaw.

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

[illegible], Jan, [illegible]

[illegible] experiences of [illegible]

[illegible]

[illegible] Ministr [illegible]

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001134700023-6

MITREGA, Jan, mgr inz.

Greetings of the Minister of Mining and Power Engineering to the miners on their Miner's Festival 1964. Wiadom gorn 15 no.12:369 D '64.

1. Minister of Mining and Power Engineering, Warsaw.

MITREGA, Jan, mgr inz.

Construction of new mines on the twentieth anniversary of People's Poland. Wiadom gorn 15 no.9:273-279 S '64.

1. Minister of Mining and Power Engineering, Warsaw.

MITREGA, Jan, mgr inz.

Address at the opening ceremony of the 12th Convention of Delegates of the Association of Mining Engineers and Technicians, Katowice, April 24-25, 1964. Wiadom gorn 15 no. 6:181-188 Je '64.

1. President of the Main Executive Board, Association of Mining Engineers and Technicians, Katowice, and Minister of Mining and Power Engineering, Warsaw.

MITREGA, Jan, mgr inz.

Address at the Miners' Festival 1963. Wiadom gorn 15 no.1: 1-10 Ja '64.

1. Minister of Mining and Power Engineeing, Warsaw.

MITREGA, Jan, mgr inz.

Industrial safety in coal mining. Wiadom gorn 14 no. 7/8:199-204 Jl-Ag '63.

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